Third and laſt part

Palmer

OF A

REPORT

ON THE

Propoſed Navigation

BETWEEN THE

EAST AND WEST SEAS,

(VIZ.) ON THE

ADVANTAGES, and DISADVANTAGES

OF

CARRYING THE NAVIGATION

ON THE

South ſide of the River Tyne,

IN THE DIFFERENT COURSES THAT IT IS CAPABLE OF.

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NEWCASTLE.
PRINTED FOR J. WHITFIELD BOOKSELLER BRIDGE-END.
AND SOLD BY HIM; AND THE OTHER BOOKSELLERS IN NEWCASTLE,
HEXHAM, CARLISLE, WHITEHAVEN,
&c. &c.
—
1795.

BRITISH MUSEUM

Gentlemen.

HAVING now, in compliance with the deſire of the Northumberland Committee, and of the laſt general meeting, at Newcaſtle, of the Subſcribers to the ſurvey, examined the ſouth ſide of the Tyne, as to its practicability of becoming the proper ſcite of the eaſtern portion, of the propoſed Navigation between the eaſt and weſt ſeas; I am conſequently enabled to ſpeak to that point with the preciſion which was wanting.

Knowing that the great advantage to be expected from the ſouthern-ſide, excluſive of what the Northern one would enjoy in common with it, was *future revenue from bringing down coals for ſea ſale, from the diſtrict eaſt of Stoksfield*; and conſidering that *delay, from numerous locks*, would in a great meaſure militate againſt that advantage; I turned my attention to carrying forward a line through that diſtrict, with as little riſe as might be. In the courſe as far as Stanly Burn (the commencement and particulars of which I will afterwards advert to.) I found no material difficulty in effecting this purpoſe with very little riſe:—And at this place where the great difficulties commence, three different modes may be adopted: *the one to enter the Tyne*; which would militate againſt the poſſibility of a regular and certain communication between Newcaſtle and Carliſle; and *therefore not to be adopted as a part of the general plan.* —the ſecond mode was to take in, from the river, by a quay, riſing above the higheſt floods, ſpace ſufficient* for a Canal, in front of all the precipices, from Stanly Burn upwards to the Hagg-ford; which occupy about three fifths of the whole ſpace; or about three quarters of a mile.—This, if the bed of the river was all on rock, and at an acceſſible depth, would be practicable; and not difficult to maintain.—The coſt, without very minute inveſtigation, cannot be aſcertained; but, I ſuppoſe, to effect the whole paſſage would require from three to four thouſand pounds; and it would then be ſubject to injury by falls from the overhanging-Cliffs:—therefore, it ought not to be attempted without very ſufficient cauſe; and this induced me to turn my attention to the remaining method, of going within, or ſouth of, the high land of the Hagg; which had been publicly aſſerted to be attended with little deep cutting—Until about a hundred yards paſt Wylam Engine, there is no impediment to carrrying forward a line of 40 feet above low water at Stella; but from thence, the ground riſes rapidly; and at the ſummit of this paſs, the ſurface of the ground, in the hollow or ſaddle of it, is ninety four feet above the bottom of the Canal; admitting it to be five feet deep; but the hollow between the hills is very narrow, and the ground riſes ſo rapidly, on each ſide, as to be at leaſt, fifteen feet high in the extremities of the requiſite width of opening of the Canal; conſequently, the depth is ſo amazingly great, that were the ſoil *even favourable*, it would be the height of folly to think of paſſing through with an open Canal; as every chain length of it, in a favourable point of view, as to its ſtanding; would, with but twenty feet width of bottom, coſt upwards of nine hundred pounds, at only 6d. per cubic yard—The number of chain lengths, near to this height, are very few, as the declenſion on each ſide is rapid: but, in three quarters of a mile, the ſpace in which it aſcends from ten feet depth of ſinking, and deſcends to it again; there would, allowing the banks above the Towing path to ſtand at nine inches to a foot (a thing impoſſible in this Soil) be upwards of four hundred and ſixty thouſand cubic yards of earth to be excavated at the depth of from ten to one hundred feet; which, at an average of 6d. per cubic yard, would amount to eleven thouſand five hundred pounds:—This plan being, therefore, totally ineligible; the only mode left of continuing a low level, would be, by tunneling through the extent of about four hundred and thirty yards; which, if the looſe ſandy ſoil, ſhould not go down to within twenty feet of the depth of the Canal, would be practicable:—but at ſuch an expence, when combined with the remainder of the deep cutting, as to preclude the eligibility.—Thus circumſtanced, I ſaw no adviſable way remaining, but to obtain immediate height of level; and, therefore, I left off the proſecution from the eaſtern end; and went forward to Hexham.——At this place, the nature of the ground (from the north part of the town, being on the verge of a ſteep declivity) points out only two lines of purſuit.—The one is the level above the ſcars, or ſteep brows near the Tyne, juſt below Hexham; and the other, is from the haughs below the town.—The former in going eaſtward, would only be attended with ſuch obſtructions as I ſhall, in their proper place, mention; but, in going weſtward, would, after paſſing through the town, and over the glen juſt beyond it, meet with very unfavourable ground on the verge of the river, in its paſſage to the place where it ſhould croſs the South Tyne.——This paſſage, if the elevation were ſimply what would paſs through Hexham, (viz.) a level of about twenty or twenty-five feet below the line propoſed on the north ſide from Newcaſtle, might be a little above the Weſt-boat Houſe:—and, if on a higher level, it might go forward to Wharnley ſcar, and croſs near Allerwaſh, but, in both inſtances, it would, as already mentioned, meet with difficulties in its progreſs.——I therefore, left the diverſities of the higher line untried; and aſſumed the lower one from the Millers Haugh; the progreſs of which eaſtward I ſhall now deſcribe, after obſerving that in its courſe weſtward, it would (with whatever gentle riſe might be requiſite) be under the neceſſity of paſſing under the ſame ſteep ſcar, eaſt of the Weſt-boat Houſe, that the road from Hexham now paſſes along; and where it is maintained with conſiderable expence, from the efforts of the river tending to tear it away.—In the fields ſouth of the Mill, and eaſt of the road leading from the bridge to the eaſt end of Hexham, a baſon might be conveniently formed: and the line, after paſſing for a ſhort ſpace under the ſteep bank above the river, (at the eaſt end of the flat grounds) which muſt be defended from further wearing away; goes forward, on the ſame level, with no material* inconvenience, until it draws near to the foot of Farnly ſcar; where, before it enters upon the deep cutting, it would ſkirt along the face of *ground already as ſteep as the natural ſoil will ſtand at:* which, where there are Haughs below to receive the earth neceſſary to be cut away, is ſo far of leſs conſequence; but a portion of it is not under this predicament; and, will conſequently be attended with the moving to a conſiderable diſtance a great ſection of earth, upwards of ſeventy feet in height, previouſly to the entrance of the hill of Farnly ſcar.—The ſoil is here, to the whole depth, ſand rather loamy; which, whenever undermined by the river, ſtands very ſteep, immediately after any ſlip or fall has ſeparated from it; until, by the effect of dry weather, or rains which are equally operative, it re-aſſumes the natural ſlope of the ſoil; which is nearly eighteen inches baſe to one foot in height:—and that hill, in this ſoil, would have to be cut through; commencing at nearly ſeventy feet ſinking, and gradually decreaſing to fifteen feet, in about four hundred yards; but, *in a valley narrower than the neceſſary width of excavation.*—To avoid this bar, and ſubſequent ones, I retained the full level of departure; but, even with this advantage, the expence of paſſing through Farnly ſcar, with an open Canal, incluſive of the ſteep precipice that would be ſkirted, would at 6d. per yard (and without the aid of Machinery it would be much higher) amount to near ſix thouſand pound.

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* This ſhould not be leſs than thirty-ſix feet, admitting the Canal to be walled and to contain width only for one boat which would give great interruption to an extenſive intercourſe.

But

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[*] This ariſes from keeping on the ſide of the ſteep ground ſouth of the road juſt eaſt of Dilſton Bridge; but is of little moment compared to the conſequent advantage of eaſily paſſing over the Devils water, with an aqueduct; as this is a mountain torrent, ſubject to high and ſudden floods.

But if there be no interior ſprings, of which the probability is that there are not, the perforation and tunneling would be from two to three thouſand pounds cheaper.

After quitting Farnly ſcar, the courſe goes onwards pretty favourably; and, paſſing under the village of the Riding, turns conſiderably ſouth of Riding Mill, to paſs Dipton-burn to advantage; and, then paſſing the ſouth end of the village of Broomhaugh, may proceed ſouth of the high road, and north of Shilford-Houſe, and even all the way to beyond the burn weſt of Eltringham, without material difficulty.—Nearly oppoſite Bywell there are obſtructions but of no great conſequence, in paſſing along ſome ſteep ground and in croſſing the Gills weſt of Bywell—The courſe, then, after paſſing Stocksfield-burn, with about a hundred yards of thirty feet embankment; and going ſouth and eaſt of the houſe of Maryſhields; goes forward with only impediments from ſmall hollows, until it meets *material difficulties* in Eltringham ſcars, and the intervening glens or ravines. And here, *the deſcent muſt either be made to the haughs under Prudhoe*; the conſequences of which I have already related; *or the level muſt be continued weſtward.*

The continuance of the level of Hexham Haughs weſtward, although it is, with very material difficulties, practicable to, and even through the foſſe of Prudhoe Caſtle, ceaſes to be capable of being carried into effect, farther, without an expenditure beyond all rational bounds—The ſteep grounds between Prudhoe, and the paſſage already deſcribed ſouth of the Hagg, are ſo covered with wood as nearly to hide all the deep glens which run ſouthward a ſhort diſtance toward the high ground, and riſe rapidly in that direction.

Theſe glens, however, like thoſe on the northern ſide of the Tyne, cannot afford any material impediment, at an elevation of about two hundred feet above neap-tide high water; at which height, or even leſs,[*] (perhaps as low as that deſcribed as ſuited to paſs through the town of Hexham) I conceive, Stanley burn might be croſſed ſomewhere near the Turnpike-road: and then paſſing near the village of Crawcrook, and above that of Ryton; the line, after proceeding onwards to its proper place of fall to the eaſtward; which of courſe would be ſhort of the vale of the Derwent; might turn to the ſouth-weſtward up that vale; and would be productive of *local advantage* in bringing lead downwards (by a ſhorter channel) and of *general advantage* in conveying lime upwards; the extent of which I will not for the preſent attempt to appreciate; but will proceed to define the extent eaſtward, of the Canal towards Newcaſtle.—If the Canal could have continued its height to Gateſhead, it would have been a deſirable object; as it would have anſwered for the paſſage and market boats,[‡] and alſo for the ſuggeſted communication to Durham; and to the ſouthweſtward.

This event, however, is precluded by the deep vales of the Derwent and the Team; and the only thing left, is to keep at the foot of the riſing lands; and onwards by Swalwell, and the Red-Heugh, to the end of Pipewell-gate. I have already ſaid that the great advantage to be expected from the ſouthern line, is the conveyance of coals for ſea ſale, from the diſtrict eaſt of Stocksfield; and, which ought to be done on a low level; which I have ſufficiently clearly ſtated to be impracticable at a moderate expence,-and inconſiſtent with the beſt line that the ſouth ſide of the Tyne admits of.-Theſe circumſtances however, by no means preclude the water conveyance of coals from that diſtrict: which is far more attainable than probably has been thought of.—Leaving, for a few moments, the deſcription of where the tideway ought to be moſt conveniently *joined*; I will commence the *quitting* of it at the higheſt coal Staith* at Stella; from whence a Canal, riſing twelve feet from low water, which is there only two to three feet under the flow of neaptides, will paſs forward, on the ſouthern ſide of the haughs, all the way to near the extremity of Ryton Willows, without interruption; and here, it will become neceſſary to riſe ſix feet.—Weſt of Ryton Church, the river, for nearly a quarter of a mile, runs cloſe to the foot of a hill riſing about five inches in each foot baſe, and of a ſoil not capable of ſtanding at more than eight inches.—After paſſing this hill, which may be attended with, from one thouſand, to fifteen hundred pounds extraordinary charge, it may go onward, on the inner or ſouth ſide of the haughs below Crawcrook, to where Stanly-burn enters the Tyne;

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[*] At either of theſe heights, Farnly ſcar would ceaſe to be a difficulty; but, both Circuity, and increaſe of expence, would take place, in paſſing the vales of Dipton and Stoksfield &c. &c.

[†] Much lower down it is impractible at any reaſonable expence.

[‡] Although in a much ſeſs degree than by the termination at Newcaſtle.

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* Mr Crawfords

and, here, becauſe of the barrier oppoſed by the Hagg, and the land within it, the Navigation muſt alſo enter the river.*

Knowing that well founded objections lie againſt the Navigation of the Tyne, it becomes incumbent on me to vindicate the propriety of entering into it, in this inſtance.—The objection to navigating this river, excluſive of the interruption to Navigation from its floods, does not ariſe from the danger, of the locks and weirs, being carried away by the impetuoſity of its torrent; which may be ſufficiently guarded againſt; but from the great fall of the river, and too great width of its bed for its uſual current, and alſo its vaſt riſe in great floods.

Although this be the *general* deſcription of the river; it cannot be ſuppoſed to hold univerſally; and, fortunately, to ſuch diſtance from the tide-way, as the great tract of coal country extends; the river, in the major part of that extent, and in all places where the nature of its ſhores render a Canal-Navigation difficult, is both gentle in its riſe, and ſufficiently contracted in its bed, to keep itſelf deep with little artificial aid:——the weirs, alſo, that will be required for penning up the

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* If on a full inveſtigation, quaying off ſpace, for a Canal out of the bed of the river under the Hagg, be found attainable at about the expence I have ſuggeſted, it will then become an object of conſideration, whether *a conſtant interruption from a great extent of narrow Canal*, even with paſſing places, *and alſo the occaſional ſtoppage by falls from the cliff*, be a leſſer grievance to the particular ſpecies of trade in queſtion (where the boats will be very numerous, and frequently meet each other, almoſt in fleets;) than the *occaſional interruption from great land floods;* which *often at the ſame time* will interrupt the commerce on the tideway.

water, will be ſar below the banks of the river; and need only be four feet above its low water ſurface. —It may, perhaps, be imagined, that the river will, from thoſe obſtructions, riſe much higher in floods; but both theory and experience prove it otherwiſe; particularly if the extent of the weir, be conſiderably more than the width of the river; as then, both, from the greater extent, and more rapid fall, the water paſſes with a comparatively trivial riſe on the crown of the weir, to what it has at its foot; and, in fine, in all great floods, the ſcite of weirs, thus conſtructed, is barely, if at all perceptable, by any difference of appearance on the ſurface of the water; which, of itſelf, ſufficiently proves that no eſſential alteration of height is produced by them, at theſe periods; and that they operate no otherwiſe than as conducive to uſeful purpoſes.

Having now obviated the objections to the river, ſo *far as relates to a partial purpoſe not otherwiſe eaſily attainable*—I will proceed to the further relation of the means I would recommend.

I have already obſerved that by riſing twelve feet above low water at Stella, it might be continued, on one level, to near the weſt end of Ryton Willows; and, by a further riſe of ſix feet, to the foot of Stanly burn:—at this place, or rather at the head of Ovingham-ford, the river has riſen only fourteen feet; but, by means of a weir, raiſing it four feet, it would enter the Canal, and be navigable, in dry ſeaſons, to the foot of the Haggford; to which, there is now a riſe of four feet.--In this part of the Navigation, which is about a mile and a quarter, and goes paſt the high ground on the ſouth ſhore, the lower part is already level and deep; and, ſo is a ſmall portion of the upper part; but the intervening ſpace, in which is all the fall of four feet, runs ſhallow, over a bed of rock eaſily raiſed; and which would all be wanted for the weir, and locks, and quay-wall of a part of the towing path under the Hagg-cliff.

The Canal from Ryton Haughs, would, in ſummer-time, or rather the low water ſtate of the river, be on the ſame level with the river itſelf, to the foot of the Hagg-ford; but, as the riſe of the river, could not be permitted to extend into the Canal, there muſt of courſe be a lock* at its entrance, equal to the riſe of the river in floods.

The foot of the ſhoal of the Hagg-ford, extends below the Farm houſe at the north end of the Hagg-hills: it is there compoſed of rock, and may be deepen'd to any convenient diſtance above that houſe: at, or near this place, it will become neceſſary to riſe ſeventeen feet, to paſs over Prudhoe-Haughs, toward Eltringham.—This riſe I propoſe in two locks; one at the place mentioned, and the other, juſt ſhort of the little runner of water, oppoſite the head of the ford.

Upon the level of ſeventeen feet riſe, the Canal will paſs along the Haughs, below the foot of Prudhoe-caſtle; and onwards, to the head of Ovingham-ford, where, its further progreſs† on the ſhore, is again prevented, by

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[*] Under this lock Stanly-burn may be paſſed by a culvert of two or three arches.

[†] Unleſs by a quay-wall; the expence of which, would depend very much upon how far the foundation could be ſecured without piles.—And

by the ſcars eaſt of Eltringham. In this ſhort ſpace, of leſs than a mile and a half from the Hagg, the river has a rapid riſe, and is diffuſed in its bed; but immediately above Ovingham-ford, it is flat and deep all the way to Eltringham.—However, to ſuit the purpoſes of the Canal Navigation, a weir of four feet riſe becomes neceſſary, at the head of Ovingham-ford, and a guard lock, as at Stanly-burn.

The Navigation will be thus effected to Eltringham, which I conceive, will ſuit all the purpoſes of the coal trade; as a waggon-way, down the vale, north from Apperly, will eaſily, by a moderately progreſſive deſcent, communicate with the foot of the croſs reach of the river, under the village of Eltringham. And, ſhould it be found eligible to carry the Navigation higher, it may, by one lock more, and a weir at the head of Eltringham-ford, be continued in the river (which is ſuitable for it) all the way to near Bywell.——But thenceforward the river aſſumes a different appearance, becoming rapid in its aſcent, extended it its bed, and variable in its channel.

Having now deſcribed the practicability of an efficient Navigation

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it likewiſe muſt be conſidered, that, in this inſtance, the Canal would have *to riſe out of the reach of floods;* which. for the purpoſe now propoſed, would be attended with two inconveniences; the one would be, that the boats to Eltringham, muſt *at all times, riſe that aſcent;* and, that water could not be procured, without penning up the river above Eltringham-ford, to the height of the tail of Bywell Dam; in which caſe, alſo, the ſurface of the Canal would have to be kept conſiderably under the height of floods; which circumſtance, on account of the ſlope of the face of the ſcars, would throw the quay-wall ſo much further into the river.

Navigation through the extent of the great field of coal, weſtward of the flow of the tide; it becomes neceſſary to conſider the vehicle of conveyance, and the means of avoiding the expence, and ill conſequences, of moving the coals from one veſſel to another.

The Keels, in uſe on the river Tyne, are of a peculiar form, calculated for particular purpoſes, but ill ſuited for the paſſage through Canals.--Their extreme length is, commonly from near forty ſeven to near forty nine feet; and their width about nineteen feet ſix inches, including the projection of the ſtrong bend or walepiece of the gunwale, and their draft of water is from four, to four feet eight inches, according to the depth of their keel, or ſharpneſs of their bottom.—Their length cannot be extended, conſiſtently with the poſſibility of two keels caſting, on one ſide, into ſmall veſſels; (viz.) one at the fore, and the other at the after coal port; therefore fortynine, or, at moſt, fifty feet, muſt be aſſumed as the "*ne plus ultra*" of length.—And as the boats, from what I have mentioned in the firſt part of this report, muſt bear ſome given ratio with the profile of the Canal; it neceſſarily follows that their tranſverſe ſection muſt be as ſmall as may be; and conſequently that their runs and entrances* muſt not be unneceſſarily fine; and that they ſhould be as ſlightly timbered as may be, conſiſtently with due regard to ſtrength; this is alſo requiſite from another cauſe; that of keeping the veſſels at a ſmall draught; ſo that they may not be interrupted by any caſual ſhoalneſs in the river part of the Navigation.

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* The ſharpneſs of their ends.

Unneceſſary width, either from flanching above the waters edge, or extraordinary thickneſs of bend (which may be compenſated for in the inſide) muſt alſo be avoided ; becauſe, it would require increaſed width of lock, which would conſume water proportionably ; and although this element would, in the preſent inſtance, be inexhauſtible ; it would, nevertheleſs, be wrong to conſume more than is abſolutely requiſite ; becauſe, from the vaſt concourſe* of veſſels for the purpoſe propoſed, the moſt œconomic uſe of water would occaſion a viſible current, and ſenſible fall in every level of Canal, each of which would have its ill conſequences.

Long eſtabliſhed cuſtom has fixed the loading of a Keel to be eight chalders, or twenty-one tons four hundred weight ; although they are capable of carrying more.——Their going down the river with cargoes ſhort of their real burthen, muſt, I conceive, be attributed to the impracticability of caſting out larger quantities, on board of the ſhips, in time *to return in the flood-tide ſucceeding the ebb that takes them down*—and their uncommon ſtrength is principally requiſite to prevent their being cruſhed, when caſting coals into ſhips lying in the Girt, in a ſtrong thwart tide.—Theſe two principles muſt, of courſe be attended to in the conſtruction of veſſels for the Navigation beyond the tide-way; as, without this, different veſſels muſt be uſed.—Now, conſonant with theſe principles, veſſels of fifty feet extreme length, and three feet ſix inches draught of water, may be conſtructed to paſs through locks of fifteen feet width, which would be ſuitable to a Canal of five feet depth, twenty-five width of bottom, and forty feet ſurface; which dimenſions, although apparently large, would not be too great, when the number of veſſels, conſtantly paſſing and repaſſing, (far exceeding the concourſe in a common Canal) are taken into conſideration.

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* It will not be unreaſonable to ſuppoſe, that, after the collieries below bridge begin to be rather exhauſted, that eighty thouſand chalders, or ten thouſand Keels of coals may come annually down the Canal : which, at two hundred and fifty working days in the year, would require daily forty boats each way : a greater paſſage, I ſuppoſe, than any Canal in Europe ; and, on particular occaſions, as coals are by no means ſhipped by equal quantities in equal times, perhaps twice as many : which would nearly keep the locks conſtantly employed in filling, and emptying, and in paſſing the boats in and out.

In the artificial, and the natural Navigation, two different modes of giving motion to the veſſels, would have to be purſued; therefore, excluſive of other cauſes, it would not, excepting in given inſtances, be eligible for the keelmen to go further with their veſſels than the entrance of the artificial part.

This portion of the Navigation, ſimilar to other Canals, or penned up rivers, would be beſt carried on by the aid of horſes; for which purpoſe, it would be neceſſary to have two veſſels belonging to every Keels-crew; ſo that the keelmen would only have to bring the veſſel, or Keel of the new conſtruction, up to the entrance of the Canal; where they would find their ſpare Keel, ready loaden, for them to take down.

The next conſideration is the difficulty the keelmen have of getting up to Stella; which in neap-tides, and ſtrong weſterly winds, they cannot effect in one tide; becauſe, from the tides flowing *no further than they are* *bound to*, they receive *no aid from the flood-tide*, *in the latter part of their courſe*; which is, beſides remarkably crooked —from theſe cauſes, it becomes eligible to bring the artificial Navigation lower down than Stella; and the extremity to which I at preſent think, it can be brought, conſiſtently with the expence not exceeding the advantage, is to the mouth of the river Derwent; therefore, juſt within the mouth of that river, which is now unoccupied with coal ſtaiths, and which would afford a ſheltered entrance into the firſt lock, appears to be the beſt outlet for the artificial Navigation.

The fall to low water, here, will be more than at Stella; and, therefore, I propoſe a double lock; which towards high water, may be entered as a ſingle one.— the continuance of the Ryton-Haugh level, down to this point, is attended with no difficulty of moment, except the neceſſity of occupying a ſlip from the *gardens* of the old Hall of Stella, or incloſing a part of the river. ——Below the Whitefield coal ſtaith there is ſome high ground; but that may be obviated, by connecting the ends of the oppoſite Iſland with the ſhore.

The additional length of Canal will be two miles; but it will ſave nearly three miles of tide Navigation; and, thoſe three miles, *the only difficult part of it*; as, below the entrance of the Derwent, there is always ſtrength of tide to carry the Keels upwards, or downwards; ſo, that if occaſion require, as there would be no delay from loading the Keels, nearly as many tides could be made from this termination* as from any lower part of the river *above bridge*.

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* Should the Whitefield ſtaith remain in its preſent ſituation, this Canal would even be ſerviceable to it; as, from the ſhortneſs of the diſtance,

THE diſtance† up the country, weſtward from the Derwent, will be as follows:—commencing ten feet above neap-tide, high water.

		Diſtance		Total diſt.		Riſe	T. riſe
		M.	Fur.	M.	Fur.	Feet	Fe
Canal	Mr Crawfords Staith at Stella -	2	-	-	-	level	
	Lock near the end of Ryton Willows	1	2½	3	2½	level	
	Stanly-Burn-foot - - - - - -	2	2	5	4½	6	
River	Navigation to foot of the ſhoal below Hagg-Ford - : - -	1	2½	6	7	level	6
Canal	Navigation to head of Ovingham-Ford - - - - - - - - -	1	4	8	3	17	23
River	Navigation to foot of Eltringham-Ford - - - - - - - - -	0	6½	9	1½	level	23

Now the greateſt of thoſe diſtances, may, with eaſe, be effected in a day, by the aid of a man, a boy, and a horſe.‡ The man, by means of rudder ropes, ſuch as they have to the wherries in the Thames, may both ſteer his veſſel, and attend, forward, with a ſetting pole, or to heave out the ſtop rope on the entrance of a lock; and the boy, may both drive the horſe, and attend to the ſtop rope; which might alſo be made the duty of an aſſiſtant lock-keeper.

Under theſe circumſtances, the *extraordinary expence*, beyond the Canal dues, on conveying coals from as far weſtwards as Eltringham, down to Tynemouth Haven, will be as follows, (viz.)

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the ſame Keel, and the ſame crew, might quickly go up to ſtella, and load from the inner face of the ſtaith. ſo as to return the ſame tide, when it could not be effected by the preſent Navigation.

† The whole diſtance from Stella to the propoſed baſon below Hexham would be ſeventeen miles in the courſe of the Canal, and the riſe from low water 107 feet.

‡ By means of a narrow wooden bridge over the Derwent, the horſes that bring down the Keels, from the upper Navigation, may occaſionally track the returning Keels, from the mouth of the Team

	s	d
A man two ſhillings, but ſay - - - - - - -	2	6
A ſtout boy - - - - - - - - - - - - - - -	1	6
A horſe - - - - - - - - - - - - - - - -	2	6
Intereſt of the coſt of: and wear and tear of an extraordinary Keel*	2	0
per Keel	8	6

Or rather leſs than thirteen pence per chalder; which with the addition of the Canal toll, would, I conceive, be very far ſhort of the advantages from being level free, and other cauſes, that would operate in favour of theſe upper collieries, beyond *what can* be experienced by thoſe on the tide-way.—Therefore, whenever the collieries below bridge, that, by their ſuperior prices at market, almoſt bid defiance to competition, begin to be exhauſted; the period will, at the lateſt, arrive, when the Navigation I have been deſcribing, ſhould of neceſſity take place.—Before I quit this ſubject, ſo intereſting to many gentlemen of great property, and to the country at large, I will advert, more than I have done, to the effects of the floods.

In the firſt place, thoſe of moderate riſe, will not materially affect the Navigation of the river; becauſe, from the river being of indefinite width, in compariſon to the boats profile, the velocity of the ſtream will not materially exceed the counter current of canals to ſupply the vacuity in the rere of the boat; beſides, the keel going up the ſtream will be light; and her coming down laden, with a favourable current, will compenſate the diſadvantage.

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* This ſum, at four tides a week, will be more than ſufficient: but, it muſt alſo be conſidered that two ſuch keels as I have ſuggeſted, will not coſt above 50 per cent more than one on the preſent conſtruction; and may both row and ſail as well, if not better.

advantage. In high floods, of courſe, the Navigation muſt ceaſe; as it alſo does, from the ſame cauſe, (unleſs with eaſterly winds,) in the upper part of the tide-way.

I made obſervations on the riſe of great floods, in different parts of the river, but thoſe moſt to be depended on, as to correctneſs of information, were at Ovinghamboat Houſe. Here, I found the great flood of 1771 had riſen above twenty-one feet, above the low water ſurface of the river; and that the higheſt flood, ſince that period, had riſen fifteen feet; alſo that floods uſually deemed great ones, only roſe ten or eleven feet—I likewiſe found that the great flood, of February laſt, on the breaking up of the Ice, had, at the Haughs oppoſite Crawcrook Mill, riſen about fifteen feet:—this great riſe was however only local; and occaſioned by the grounding, and blocking up of the Ice, lower down the river.—From this it follows; that, leaving to caſualties* ſuch a great flood as that of 1771, which may not happen in a century; it becomes neceſſary to guard againſt a riſe of fifteen or ſixteen feet; which will be more eaſily effected, than at firſt, may be imagined.

The *extent* of this riſe will only have to be guarded againſt, at the up-ſtream entrance of the Canals; and from *that extent* there muſt be deducted the height of the weirs; which will reduce the height requiſite to be guarded, to eleven or twelve feet; and this will ſuddenly decline from the great fall of the river below the weirs,

Were this inconvenience *more to be dreaded than it is*;

I would

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* The ill effects, of even ſuch a great flood, may be reduced to trivial conſequences; but to enter into the means of it, would both be too prolix, and unneceſſary in the preſent ſtage of the buſineſs.

I would recommend, in place of riſing ſix feet at the end of Ryton Willows, to enter the river, there, by a guard lock and weir, which would carry the Navigation up to Stanly-burn foot; and ſave nearly two miles of Canal; and avoid the difficulty of the ſteep bank at the commencement of it—the river is, for this ſpace, in general, narrow and deep; excepting the fords above, and below Crawcrook Mill, which would be flooded by the weir, and might be kept deep by contraction. I mention this as perfectly practicable; but, ſo far as it at preſent appears to me, I give the preferance to the other mode I have deſcribed.

Having, now, ſaid all that immediately occurs to me, relative to the moſt effectual means of bringing into the market, the extenſive field of Coals, lying between Stella and Stocksfield; I ſhall conclude by drawing a comparative ſtatement of the advantages to be derived from the commencement of the propoſed great weſtern Canal, being on the northern, or the ſouthern ſide of the Tyne; and with ſome further obſervations on the junction of the northern line with that river.

SOUTH LINE.

ADVANTAGES, from the eaſtern part of the propoſed Canal from the eaſt to the weſt ſeas, being on the ſouthern ſide of the Tyne; and upon the level of the town of Hexham, eaſtward to where interrupted by the vale of Derwent:—with remarks on the ſeparate advantages of the lower ſouth line.

1 The capability of a level branch up Derwent vale which would convey* lime up that country.

NORTH LINE.

ADVANTAGES, from the eaſtern portion of the Canal being on the North ſide of the river Tyne, ; and upon one level from Newcaſtle to Haydon-bridge.

1 The capability of a branch, north from Newcaſtle, into Northumberland: the advantages of which I have deſcribed in *pages* 14 &c. to 18 in the *firſt part* of this report:—and which appear very far beyond what can be obtained from any line

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* *The lower level from Hexham would not enjoy this advantage, or*

SOUTH LINE.

even the next mentioned; but by the means deſcribed, of walling off part of the river under the Hagg, and Eltringham ſcars, it may be made to unite with the colliery line; which would, however be attended with this inconvenience; that either the boats, on the whole line from ſea to ſea, muſt be reduced to the length of 50 feet, or there muſt be great waſte of water in the locks, and an extraordinary current in the Canal—And, if the locks are made twice as long, and the Keels to go in pairs (which to go and return in a day from Eltringham could not often be effected by one horſe) a ſimilar waſte would take place, with the Canal boats, which can by no means be twice as long as the Keels. Alſo it would be attended with the occaſional interruption of the whole trade,

2 The Derwent branch might bring ſome lead down, that perhaps might otherwiſe fall into neither Canal.

And the Canal on the ſouth ſide of the Tyne, would be nearer the eaſtern part of the lead country.

NORTH LINE.

up the Derwent, even allowing that the advantage from the conveyance of lime may be interfered with, by the Canal running more weſtward, up the vale of Pont, than expected: and conſequently drawing near another ſource of ſupply of lime; and more diſtant from the vicinity of the ſea coaſt, which requires it.—It muſt, however, be conſidered, that there is no neceſſity of ſtarting upon the *high level* of Newcaſtle, but from any lower level, in the courſe towards Barrasbridge, that may be found beſt ſuited to the purpoſe mentioned; and, that even, ſhould deſcent be requiſite, in the courſe of the line, it can be attended with no inconvenience from the waſte of water.—The parts that* I mentioned as near the ſuppoſed line, and containing limeſtone under much cover, and not eaſily laid dry, were near the banks of the Wanſbeck, about four or five miles weſt of Morpeth.

Poſſibly ſome lead would go along the Derwent branch, whenever executed, that would never come to the northern Canal; but the quantity, in point of *toll* to the Canal proprietors, could not be very productive.———And, as to lead, that would come to the ſouthern Canal; it would equally come to the northern, as the diſtance between the two would be very trivial, and could not operate ſo far as to occaſion any alteration in the number of turns, or gaits per day; and, conſequently, muſt produce no ſenſible alteration in the price of land carriage; which in all inſtances, is little affected by a trivial increaſe of diſtance; as the charge of putting in, and taking out, the articles

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* *Vide Note, to page 14. Firſt part*

SOUTH LINE.	NORTH LINE.
	is common to them all, and muſt be borne by the ſhorteſt More bridge acroſs the Tyne, are, however, obviouſly requiſite, and, when erected, will, in a great degree, take away any local diſadvantage to the proprietors of land on either ſide.—If one bridge only, be erected below Corbridge: the ford from Eltringham to Ovington appears the moſt eligible; becauſe of the highroads leading north and ſouth to it, and alſo of the approach of the Canal there, to the banks of the Tyne: which bridge would be mutually convenient for the conveyance of the products of the ſouthern country, and the return of lime, both for its improvement, and the land more eaſtward.—And between Ridleyhall, and Featherſtonebridges, I conceive a bridge would be eligible, ſome where below Haltweſel, and oppoſite the *loweſt paſs* through the mountains, *through which a road could be made*, from the lead country lying ſouth and S. W. of it.
3 If a line to the extent of the coal country, take place; as, in all probability, it may; as it would pay, excluſively, for itſelf; the advantages of that commerce would accrue to the general line, if this were made a *part of the main Canal*. And if the Canal be executed ſeparately, and the main Canal be carried on the northern ſide, the latter might loſe the carriage of the produce of the ſouthern country to that extent, and of the immediate ſhore of the Tyne on the north ſide.	3 The diſadvantages, mentioned on the oppoſite ſide, as ariſing from the execution of the coal branch to Eltringham, would not be conſiderable; becauſe the north ſide would be intercepted by the Canal; and the diſtrict, on either ſide, that would come to the Navigation, would be trivial, ſo far as relates to the heavy products, on account of the ſhortneſs of the diſtance from the tide-way.

NORTH LINE.

4 Market Boats, for the reaſons I have already ſtated, at large, in my former Report, will be of very little value; *unleſs on the long level to Newcaſtle.*——As the public may not clearly comprehend what I mean by Market boats; it is neceſſary for me, to explain, that,

I do not mean, the conveyance by them, of all the heavy produce of a great farm, that may be ſold by ſample, or otherwiſe, to one merchant or great buyer; for, that will find its way by water in the common trading boats; in whatever line the Canal may come; but ſimply, that which comes in ſmall quantities, to ſupply the daily or weekly demand; and is, ſmall as it may be, neceſſarily accompanied by the owner, or his agent; therefore capable of creating great benefit by the conveyance of the perſon along with the articles.—And, ſmall as this may appear, it is of infinitely more moment to the proprietors of land, than it can be thought of, without due reflection.—Every one knows that, in the vicinity of large towns, land lets much higher than it does, under equal predicaments, at a diſtance; and, if we enquire whence that ariſes, we will find, that it is not by the eaſe of conveyance of their grain; becauſe they grow little or none of it: but, from the paſturing of horſes, and cattle, and from the means of conſtant and eaſy diſpoſal of all the leſſer products of the farm, *ſuch as milk, butter, eggs, poultry, &c.* of which they enjoy the monopoly—Therefore, by affording that means to any given diſtance: the lands, in the vicinity, by theſe means, even although on the ſouth ſide of the Tyne, will come in for a portion of thoſe advantages; and the town itſelf will be reciprocally benefited, by ſome reduction in price; which, of courſe, will occaſion an increaſed demand:—and, in place of market boats going only twice a week, I have no doubt of its being eligible to run ſmaller ones on the intervening days; which will encreaſe the revenue far beyond what I have eſtimated, would ariſe from this cauſe.*—On the ſouth ſide, theſe advantages are ſo far precluded, by the deſcent, and other cauſes, as to be likely to produce little beyond the charge of keeping up the the boats, and drawing them backwards and forwards.

5 Passage Boats—The proprietors of the adjacent land, are likewiſe, intereſted in this circumſtance; as I know that, in the vicinity of the Grand Canal of Ireland, many country houſes have been built; (and of courſe the land lying near them, increaſed in value) and others, previouſly erected, have been let on higher terms, purely on account of the eaſy means of conveying the reſidents, or their families to town; either on buſineſs or pleaſure; which circumſtance is, alſo, ſo far availed of by

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Vide firſt report, page 39. where this article is entered into at large and eſtimated at 40l. per week. 2080l. per annum.

by all the vicinity of the line, for many miles on each ſide, *increaſing as the diſtance*, that, perhaps, ten to one travel in the boats, to what would go by other conveyances: which would, alſo, be many times more coſtly and leſs convenient.—— And, to theſe travellers from the neighbouring country, to this local emporium of buſineſs and public diverſions, I may add numerous others, from all parts of the kingdom, that would be attracted, by the beauty and novelty of the ſcene, to travel along the Canal; where, from the circumſtances of its courſe, they would enjoy a vaſt variety of ſcenery, ariſing from numerous combinations of wood and water; and, from the contraſted views of extended plains and lofty mountains;—from the Tyne and the Eden meandring through their vales, bounded alternately, by marſhy borders and overhanging Precipices; and the deeply indented ſhores of the weſtern ocean, diverſified with low head lands and bold promontories.—*Under theſe predicaments*, I am inclined to think, it will appear that I have under rated the produce of the paſſage boats, at 2080l.* a year for an extent of nearly one hundred miles; not one half of which could ever be expected by the ſouthern line, running through *the whole eaſtern* deſcent, from the ſummit to the ſea. Add to this, that the *northern line* is cheaper: and I have done the compariſon.

If one ſide appear more favourable than the other, I hope it will not be attributed to partiality in the deſcription; but to the concurrence of favourable circumſtances:—for, on all other grounds, I diſclaim partiality; as I feel none but what ariſes from conviction; according to the evidences that have yet come before me.

I ſhall now finiſh the third, and laſt, part of this report on the Navigation between the two ſeas, by ſpeaking to its final communication with the tide-way below Newcaſtle bridge.

In my firſt report, I mentioned the propriety of a wet dock on Ouſeburn.—A dock, there, would have all the advantages I propoſed; and a ſhort and eaſy communication with the Canal at the head of the town; but, it would undoubtedly, in a given degree, remove the ſea commerce of the town from its preſent quarter; and, therefore, although there is no room to make docks between the Stockbridge and the quay; as the whole ſpace is covered with houſes of *conſiderable value in the maſs*, though little individually; I ſo far coincide with the opinion of the gentlemen who have ſuggeſted that paſſage, that I think there would be a propriety in the final outlet of the Canal being in that quarter; as, it may, by the following means, be made to anſwer almoſt every purpoſe, (viz.) by purchaſing all the ſpace from Rewcaſtle Chare, the head of Broad-Chare, and Cowgate, to Cocks-Chare, on the eaſt; and from the Quay-ſide, northward, to the Wall-Knoll, and Stockbridge; a large tract of ground would be obtained; in which might be formed a walled Canal, from the Stockbridge downwards, with extenſive warehouſes and yards abutting upon it, and facing broad ſtreets on their other fronts.—This Canal, which ſhould, at leaſt, *be wide enough for three boats*, might come to within about fifty yards of the front of the Quay; and, there, terminate in a Canal-boat baſon, with only a narrow quay between them and the ſea veſſels; ſimilar to what I have recommended at Maryport. About two boat lengths, towards the river, would be ſufficient; and on the other ſides of the baſon, which ſhould be fronted with public quays, boats might lie to load or deliver, either from the veſſels at the cranes, or the exiſting warehouſes in the vicinity.

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* *Vide firſt report, page* 38.

From this baſon, there ſhould be a lock into the river; and of courſe the boats might, in ſuch few ſituations, near the town, as they can lie in afloat, and ſheltered from keels, load and unload into ſhips.—And boats, of a ſtill ſtronger conſtruction, capable of bearing the ground without ſtraining, might go down to Shields, or even to Sunderland.

It, however, plainly follows, that if the whole Navigation were obliged to come into the tide-way at Lemington, or elſewhere, that *all the boats*, in place of *a few of them for that purpoſe*, muſt be of the ſtronger conſtruction mentioned; and conſequently both coſt more money, and carry leſs burthen.—The tide-way of of the Tyne differs from the Thames, and many other rivers, in this:—that, many parts, of the beſt of the channel, will not float a boat at low water; and if a Canal boat ſhould chance to ground, on a falling tide, ſhe would be liable to ſtrain by the ſand waſhing from under her ends; and, alſo, the concourſe of unwieldy veſſels, calculated for bearing great ſhocks, and conſequently leſs frequently prevented from giving and receiving them, is greater in the Tyne than perhaps any other river.

I need not ſay that much of the eligibility of the propoſed communication, by the Stockbridge; which would be a capital improvement to the town; will depend on whether the ſcites of the propoſed warehouſes, &c. with the materials of the old houſes, will amount to nearly as much as the coſt of the premiſes in queſtion; on which I offer no opinion.—And, I only mention this, as a ſuggeſtion, for the conſideration of gentlemen that may be concerned; as, I conceive, that in the beginning, it will be eligible to have the act, ſhould one ever be applied for, unincumbered with the difficulties of oppoſition from the proprietors through whoſe premiſes it may go, or totally occupy, in its deſcent from the Haydonbridge level; and, conſequently, leave that part to be determined by future circumſtances, and the moſt advantageous offers: for, wherever the line goes, it will be attended with immenſe advantages to the proprietors; as elegant ſtreets may be formed at a proper diſtance from the banks of the upper levels, conveniently ſituated for warehouſes in the rere; and on the lower levels, warehouſes may occupy the very bank,* leaving only a foot way in front.

In pulling down, and rebuilding, on an improved plan, a conſiderable portion of an old town; much difficulty will ever ariſe from the parties whoſe property is diſpoſed of, according to the rates fixed by a jury of their neighbours; becauſe, the proprietors themſelves are apt to affix *an imaginary value, not that ſimply attached to the premiſes in their preſent ſtate*, but what *they poſſibly might be equal to, ſubſequent to the projected alterations:* thus, expecting that the parties making the improvement, ſhould pay, not only the fair intrinſic value, *but alſo that which ariſes from the reſult of their own labours, and which eventual increaſe can alone enable them to make the purchaſes of the exiſting premiſes and the neceſſary alterations.*—On the other hand, it may be fairly ſaid, that for the purpoſe of giving an *advantageous ſpeculation* to adventurers, further than is conſiſtent with the public intereſt, it would be highly unjuſt, even for a reaſonable equivalent, to deprive of their property, thoſe perſons who are deſirous to remain in the ſituation they are.

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* Wherever not interfering with other circumſtances.

On theſe principles, it appears fair and liberal, that if any profit, beyond the public convenience, ariſe from ſuch improvement; it ſhould be rateably enjoyed by the parties whoſe property has been diſpoſed of; and thus they will reap all the local advantage they poſſeſſed; and, if they pay higher for the repoſſeſſion of their old premiſes, ſo as to occaſion a profit on the whole, they will have the ſatisfaction of knowing, that they will receive a ſhare of that profit, according to the value of the property they diſpoſed of.

I am

GENTLEMEN,

Your obedient and humble Servant

WILLIAM CHAPMAN.

Newcaſtle, Auguſt 10th 1795.

COMMITTEE OF, AND SUBSCRIBERS TO, THE SURVEY OF A LINE
OF NAVIGATION BETWEEN THE EAST AND WEST SEAS.

FINIS.

ERRATA.

Page 8, lines 7 and 9, from the bottom; for "*weſtward*" read "*eaſtward.*"
(in part of the impreſſion)
Page 15 line 5 from the bottom; for "*leſs*" read "*more.*"

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(VIZ.) FROM

HAYDON-BRIDGE to MARYPORT;

WITH

OBSERVATIONS ON LINES

TO

Penrith, Sandsfield, Ravenſbank, Bowneſs, Wigton, &c.